CLAIM AMENDMENTS

A listing of an entire set of claims 1-23 is submitted herewith per 37 C.F.R. §1.121. This listing of claims 1-23 will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) Positioning apparatus[[, especially for measuring machines, manufacturing machines or the like,]] comprising:

at least one position sensor (12), at least one position controller (13) and at least one position actuator (14), wherein the or each position sensor (12) measures the position of a position-controlled device (11), wherein the or each position controller (13) uses measurement signals provided by the or each position sensor (12) as input signals, and wherein output signals generated by the or each position controller (13) are used by the or each position actuator (14) to control the position of said position-controlled device (11),

the positioning apparatus further comprising a gravity compensation [[means]] device compensating gravitational forces acting on said position-controlled device (11), characterized in that the gravity compensation [[means comprises]] device includes at least one gravity compensation controller (16; 25, 28) and at least one gravity compensation actuator (17), wherein the or each gravity compensation controller (16; 25) uses the output signals generated by the or each position controller (13) as input signals, thereby generating output signals used by the or each gravity compensation actuator (17) to compensate gravitational forces acting on said position-controlled device (11).

2. (Currently Amended) Positioning apparatus according to claim 1, characterized in that the gravity compensation actuator (17) comprises a spring [[means]] (18), a string [[means]] (19), a pulley [[means]] (20) and a motor [[means]] (21).

3. (Currently Amended) Positioning apparatus according to claim 2, characterized in that the spring [[means]] (18) is attached with a first end preferably to the position-controlled device (11) and with a second end to the string [[means]] (19).

4. (Currently Amended) Positioning apparatus according to claim 2, characterized in that the string [[means]] (19) is wound around the pulley [[means]] (20), wherein the pulley [[means]] (20) is driven by the motor [[means]] (21), and wherein the motor [[means]] (21) is controlled by the output signals generated by the gravity compensation controller (25; 28).

5. (Currently Amended) Positioning apparatus according to claim 2, characterized in that the pulley [[means]] (20) is driven by the motor [[means]] (21) in a way that the tension in the spring [[means]] (18) is kept constant and equal to the gravitational forces acting on said position-controlled device (11).

6. (Currently Amended) Positioning apparatus according to claim 1, characterized in that the gravity compensation [[means comprise]] device includes one gravity compensation controller (16), wherein the output signals of said one gravity compensation controller are used to control the gravity compensation actuator (17).

7. (Currently Amended) Positioning apparatus according to claim 1, characterized in that the gravity compensation [[means comprise]] device includes two gravity compensation controllers, wherein a first gravity compensation controller (25) uses the output signals generated by the position controller (13) as input signals, wherein a second gravity compensation controller (28) uses the output signals generated by the first gravity compensation controller (25) as input signals, and wherein output signals from said second gravity compensation controller (28) are used to control the gravity compensation actuator (17).

8. (Original) Positioning apparatus according to claim 7, characterized in that the output signals generated by the first gravity compensation controller (25) are summed with a position setpoint signal of said position controller (13), wherein the resulting signal is used as setpoint for said second gravity compensation controller (28).

9. (Currently Amended) Positioning apparatus according to claim 7, characterized in that the second gravity compensation controller (28) uses the measurement signal of a motor position sensor (29) as input signal, wherein said motor position sensor measures the position of the motor [[means]] (21) of said gravity compensation actuator (17).

10. (Original) Gravity compensation device for compensating gravitational forces acting on a position-controlled device (11), wherein the position of said position-controlled device (11) is measured by at least one position sensor (12) and controlled by at least one position controller (13), characterized by at least one gravity compensation controller (16; 25, 28) and at least one gravity compensation actuator (17), wherein the or each gravity compensation controller (16; 25) uses the output signals generated by the or each position controller (13) as input signals, thereby generating output signals used by the or each gravity compensation actuator (17) to compensate gravitational forces acting on said position-controlled device (11).

11. (Currently Amended) Gravity compensation device according to claim 10, characterized in that the gravity compensation actuator (17) comprises a spring [[means]] (18), a string [[means]] (19), a pulley [[means]] (20) and a motor [[means]] (21).

12. (Currently Amended) Gravity compensation device according to claim 11, characterized in that the spring [[means]] (18) is attached with a first end preferably to the position-controlled device (11) and with a second end to the string [[means]] (19).

13. (Currently Amended) Gravity compensation device according to claim 11, characterized in that the string [[means]] (19) is wound around the pulley [[means]] (20), whereby the pulley [[means]] (20) is driven by the motor [[means]] (21), and whereby the motor [[means]] (21) is controlled by the output signals generated by the gravity compensation controller (16; 28).

14. (Currently Amended) Gravity compensation device according to claim 11, characterized in that the pulley [[means]] (20) is driven by the motor [[means]] (21) in a way that the tension in the spring [[means]] is kept constant and equal to the gravitational forces acting on said position-controlled device (11).

15. (Previously Amended) Gravity compensation device according to claim 10, characterized by one gravity compensation controller (16), whereby the output signals from said one gravity compensation controller (26) are used to control the gravity compensation actuator (17).

16. (Previously Amended) Gravity compensation device according to claim 10, characterized by two gravity compensation controllers, wherein a first gravity compensation controller (25) uses the output signals generated by the position controller (13) as input signals, wherein a second gravity compensation controller (28) uses the output signals generated by the first gravity compensation controller as input signals, and wherein output signals from said second gravity compensation controller (28) are used to control the gravity compensation actuator (17).

17. (Original) Gravity compensation device according to claim 16, characterized in that the output signals generated by the first gravity compensation controller (25) are summed with a position setpoint signal of said position controller (13), whereby the resulting signal is used as setpoint for said second gravity compensation controller (28).

18. (Currently Amended) Gravity compensation device according to claim 16, characterized in that the second gravity compensation controller (28) uses the measurement signal of a motor position sensor (29) as input signal, whereby said motor position sensor measures the position of the motor [[means]] (21) of said gravity compensation actuator (17).

19. (Original) Method for compensating gravitational forces acting on a position-controlled device, whereby the position of said position-controlled device is measured by at least one position sensor and controlled by at least one position controller, characterized in that at least one gravity compensation controller uses output signals generated by the or each position controller as input signals thereby generating output signals used by at least one gravity compensation actuator to compensate gravitational forces acting on said position-controlled device.

20 (Currently Amended) Method according to claim 19, characterized in that the gravity compensation actuator comprises a spring [[means]], a string [[means]], a pulley [[means]] and a motor [[means]], whereby the spring [[means]] is attached with a first end to the position-controlled device and with a second end to a string [[means]], wherein the string [[means]] is wound around the pulley [[means]], and wherein the pulley [[means]] is driven by the motor [[means]] using the output signals generated by the gravity compensation controller in a way that the tension in the spring [[means]] is kept constant and equal to the gravitational forces acting on said position-controlled device.

21. (Previously Amended) Method according to claim 19, characterized in that one gravity compensation controller is used, whereby the output signals of said one gravity compensation controller are directly used to control the gravity compensation actuator.

22. (Previously Amended) Method according to claim 19, characterized in that two gravity compensation controllers are used, wherein a first gravity compensation controller uses the output signals generated by the position controller as input signals, wherein a second gravity compensation controller uses the output signals generated by the first gravity compensation controller as input signals, and wherein output signals of said second gravity compensation controller are used to control the gravity compensation actuator.

23. (Currently Amended) Method according to claim 22, characterized in that output signals generated by the first gravity compensation controller are summed with a position setpoint signal of said position controller, whereby the resulting signal is used as setpoint for said second gravity compensation controller, and the second gravity compensation controller uses the measurement signal of a motor position sensor as input signal, whereby said motor position sensor measures the position of the motor [[means]] of said gravity compensation actuator.